International Standard 7837

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Fertilizers — Determination of bulk density (loose) of fine-grained fertilizers

Engrais — Détermination de la masse volumique sans tassement des engrais fins

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 7837 was developed by Technical Committee ISO/TC 134, *Fertilizers and soil conditioners,* and was circulated to the member bodies in July 1982.

It has been approved by the member bodies of the following countries:

Austria	Iraq	Portugal
Brazil	Israel	Romania
China	Italy	South Africa, Rep. of
Chile	Kenya	Spain
Czechoslovakia	Korea, Rep. of	Sri Lanka
Egypt, Arab Rep. of	Mexico	United Kingdom
France	Netherlands	USA
Germany, F.R.	New Zealand	USSR
Hungary	Norway	
India	Poland	

No member body expressed disapproval of the document.

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Fertilizers — Determination of bulk density (loose) of fine-grained fertilizers

0 Introduction

A method for the determination of the bulk density (loose) of solid fertilizers having particle sizes within the frequently encountered range from about 0,5 to 5 mm is specified in ISO 3944. This method is not, however, suitable for fine-grained fertilizers having a large proportion of particles of diameters less than 0,5 mm. Such fertilizers pass with difficulty, in most cases, from the specified funnel into the measuring cylinder, generally cause considerable dust nuisance, and are inclined to form hollow spaces (air cavities) within their bulk volume. The bulk density values obtained are, thus, too low.

In the case of fine-grained fertilizers, therefore, it is necessary to use a dust-tight, non-clogging apparatus, with a relatively wide measuring cylinder.

1 Scope and field of application

This International Standard specifies a method for the determination of the bulk density (loose) of solid fine-grained fertilizers.

The method is applicable to fertilizers which contain a large proportion of particles of diameters less than 0,5 mm.

NOTE — For fertilizers which contain a large proportion of particles of diameters within the range from 0,5 to 5 mm, a method is specified in ISO 3944.

The method is applicable to dry fertilizers only. If the fertilizer has absorbed moisture during transport or storage, it is necessary to dry it in an environmental chamber, with constant low humidity, prior to the determination.

2 Reference

ISO 3944, *Fertilizers — Determination of bulk density (loose).*

3 Definition

bulk density (loose) of a fertilizer: The mass per unit volume of a fertilizer after it has been tipped freely into a container under specified conditions.

The bulk density (loose) is expressed in grams per cubic centimetre (g/cm³).

4 Principle

Pouring of the fertilizer from a specified filling device into a specified measuring cylinder of known volume and weighing of the contents of the cylinder.

5 Apparatus

5.1 Balance, capable of weighing to the nearest 1 g.

5.2 Apparatus for determination of bulk density (loose), having the approximate dimensions given in the figure and consisting of:

5.2.1 Measuring cylinder (1), of capacity 1 000 ± 5 cm³.

5.2.2 Intermediate piece (2) with **hinged cover (3).**

5.2.3 Filling device (4) with **spring-suspended locking lever (5)** for holding or loosening the hinged cover. The hinged cover is opened by manipulating the lever so that the contents of the filling device discharge into the measuring cylinder.

NOTE — Those parts of the apparatus which are in contact with the fertilizer shall be made of corrosion-resistant material (glass, plastics, etc.).

5.3 Spatula, approximately 200 mm x 20 mm, or other suitable scraper.

6 Procedure

Pour the fertilizer into the filling device (5.2.3) up to the brim. Open the hinged cover by manipulating the locking lever.

After 2 min, remove the empty filling device and the intermediate piece (5.2.2) from the measuring cylinder (5.2.1). Scrape away the surplus fertilizer from the measuring cylinder using the spatula or other suitable tool (5.3).

Weigh the contents of the measuring cylinder to the nearest 1 g.

Carry out two determinations, in rapid succession, on the same test portion.

7 Expression of results

7.1 Method of calculation and formula

The bulk density (loose) of the fertilizer, in grams per cubic centimetre, is given by the formula

$$D = \frac{m}{V}$$

where

m is the mass, in grams, of the test portion;

V is the capacity up to the brim, in cubic centimetres, of the measuring cylinder.

Take as the result the arithmetic mean of the two determinations provided that the requirement for repeatability (see 7.2) is satisfied.

7.2 Repeatability

The difference between the results of two determinations, carried out in rapid succession by the same operator, shall not exceed 0,02 g/cm^3.

8 Test report

The test report shall include the following particulars:

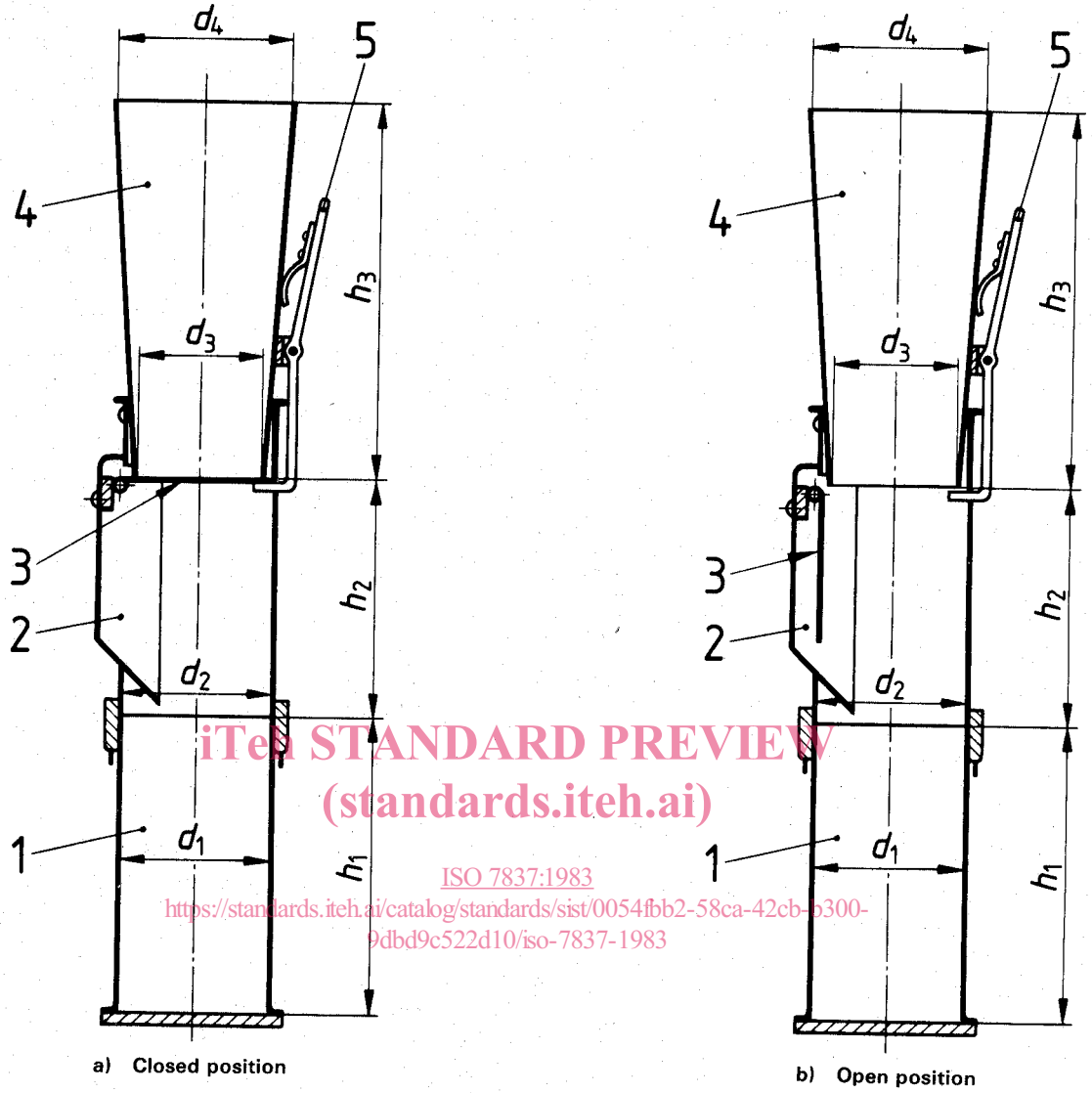
a) identification of the sample;

b) the reference of the method used;

c) the result and the method of expression used;

d) any unusual features noted during the determination;

e) any operation not included in this International Standard or regarded as optional.



a) Closed position

b) Open position

Measuring cylinder (1)

internal diameter	d_1 = 87 ± 1 mm
internal height	h_1 corresponding to a capacity of 1 000 ± 5 cm^3

Intermediate piece (2)

internal diameter	d_2 = 87 ± 1 mm
height	h_2 = 135 ± 1 mm

Hinged cover (3)

Filling device (4)

lower internal diameter	d_3 = 79 ± 1 mm
upper internal diameter	d_4 = 99 ± 1 mm
height	h_3 = 199 ± 1 mm

Spring-suspended locking lever (5)

Figure — Apparatus for determination of bulk density (loose) of fine-grained fertilizers